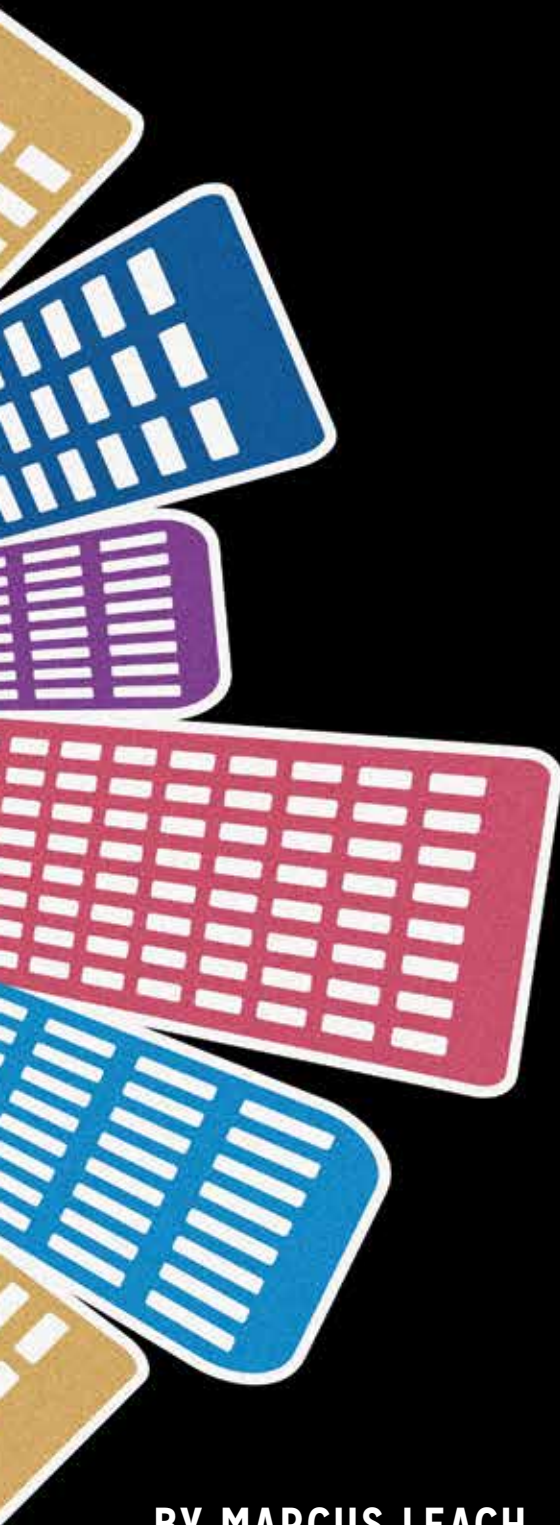




# PROPERTY RIGHTS IN OUTER SPACE





**BY MARCUS LEACH**

**O**n October 4, 1957, mankind took its first step into outer space with the launch of the Soviet satellite, Sputnik 1.<sup>1</sup> Since that day, we have walked on the Moon, driven rovers on Mars, and explored our solar system via satellites. Historically, the enormous cost required to undertake these missions has left the challenges of space exploration entirely in the hands of national governments.<sup>2</sup> However, over the last few years, private companies have proven their ability to make use of outer space. Independent businesses are maintaining networks of satellites and even transporting supplies to the International Space Station.<sup>3</sup> However, the ambiguity with regard to property rights in space is currently hindering further privatization of space exploration.

Current international space law took shape during the space race, when reaching outer space was a competition between two superpowers in the Cold War rather than an opportunity for private development. To prevent the use of space for political and military uses, the United States and the Soviet Union signed the Outer Space Treaty,<sup>4</sup> which specified that space exploration be undertaken purely for the advancement of science. This treaty was the second of the so-called “nonarmament” treaties, and it had some of its concepts and provisions modeled after the Antarctic Treaty.<sup>5</sup> The Outer Space Treaty, like the Antarctic Treaty, “sought to prevent a new form of colonial competition and the possible damage that self-seeking exploitation might cause.”<sup>6</sup>

Some argue that Article II of the Outer Space Treaty bans all extra-terrestrial property rights. Article II states that “[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” Others say that Article II only applies to nations, arguing that individuals are free to claim any outer space real estate they might desire. However, this argument ignores Article VI of the

Outer Space Treaty, which declares that nations are required to ensure their citizens comply with the provisions of the treaty—including the ban on land claims.

Although Article II bans the appropriation of real property in outer space, other provisions of the treaty lend support to property rights. For example, the treaty states that the use and exploration of outer space shall be free and without discrimination of any kind, and that there shall be free access to all parts of space.<sup>7</sup> It also allows the use of equipment and facilities necessary for peaceful activities and allows individuals and nations to retain the private property rights of anything launched into, or built in, space.<sup>8</sup>

In 1979, a small group of countries proposed a new treaty intended to govern economic activities in space, called the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Agreement).<sup>9</sup> Though this treaty is referred to as the Moon Agreement, it applies to all celestial bodies in the solar system, not just the Moon. The Moon Agreement states that all off-Earth resources are “the common heritage of mankind,” and is modeled after the 1982 Law of the Sea Treaty, which, among other things, regulates seabed mining. Fortunately for those desiring outer space property rights, the Moon Agreement is a failed piece of international law because it has not been ratified by any spacefaring nation. However, the very existence of the Moon Agreement lends support to the claim that the Outer Space Treaty allows private property in space, because if the Outer Space Treaty did not allow for private property, there would be no need for the Agreement to explicitly outlaw private property rights.<sup>10</sup>

To make sense of the confusing and possibly contradictory provisions in the Outer Space Treaty, customary international law is used to determine how nations have interpreted these provisions, both internally, and in dealings with other nations. Claims to celestial



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bodies have been attempted for years, but none have been recognized by customary law. One of the most publicized land claims comes from Dennis Hope, an American entrepreneur, who sells extraterrestrial real estate.<sup>11</sup> In 1980, he started the Lunar Embassy Commission and currently claims to have sold more than three million acres on the Moon. Hope bases his claim on the fact that the United States, United Nations, and former Soviet Republic all failed to respond to his written claim of intent to sell extraterrestrial property that was mailed to their respective offices. Trumping Hope's claim, in 1996, Martin Juergens from Germany claimed that the Moon belonged to his family since July 15, 1756, when a Prussian king (Frederick the Great) presented it to his ancestor Aul Juergens as a symbolic gesture of gratitude for services rendered, and decreed that it should pass to his youngest born son. The following year, three men from Yemen sued NASA for invading Mars when they landed the Pathfinder spacecraft and Sojourner rover on the red planet in December 1996.<sup>12</sup> They claimed

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*Marcus Leach is a student at American University Washington College of Law and is the President and Founder of the WCL Space Law Society.*

that based on the mythologies of the Himyaritic and Sabaean civilizations, they inherited the red planet from their ancestors 3,000 years ago.

The only claim to actually go to trial involved Gregory W. Nemitz and his claimed ownership of the asteroid 433 Eros.<sup>13</sup> Nemitz filed a claim for the asteroid Eros with an online database known as the Archimedes Institute, and then sent NASA a bill for \$20 in parking fees when NASA landed the NEAR-Shoemaker probe on Eros in 2001. The U.S. Ninth Circuit Court of Appeals dismissed the suit because Nemitz was unable to prove actual ownership rights for Eros.

Some argue that the absence of property rights in space is to blame for the lack of commercial success beyond Earth's orbit, and that governments should allow property rights to incentivize development of the Moon and other extraterrestrial natural resources. Although the Ninth Circuit ruling should be enough to invalidate any extraterrestrial land claims made from within the safety of Earth's atmosphere, there is nothing preventing private companies from going into space and bringing home extraterrestrial resources. Many private companies are okay with not being able to own land in space, as long as they can have property rights in the resources that they gather.

Asteroid mining is an industry that would benefit from a relaxed stance on property rights because asteroids contain significant amounts of precious metals, such as platinum, titanium, and uranium. For example, the asteroid 16 Psyche, located between Jupiter and Mars in the main asteroid belt, is about 150 miles wide and "is composed of enough nickel iron to meet the world's demands for several million years."<sup>14</sup>

Extraterrestrial real estate also contains minerals that are in scarce supply here on Earth, such as rare earth elements.<sup>15</sup> Rare earth elements are used in many of the devices we use every day, including computer memory, cell phones, catalytic converters, and magnets.<sup>16</sup> In addition to metals and other traditional resources, one of the main prizes in extraterrestrial mining is helium-3.<sup>17</sup> This gas is a fuel for nuclear fusion reactors, which promise a much higher energy yield than current fission-powered reactors. Though commercial fusion reactors are not yet available, when they do become available, the earth's available helium-3 supply will likely quickly become exhausted.

To prepare for extraterrestrial mining, Planetary Resources Inc., cofounded by Eric Anderson and backed by Google's Larry Page and Virgin's Richard Branson, is in the process of developing the technology and techniques required for harvesting resources from asteroids.<sup>18</sup> Eric Anderson calls asteroids "the low hanging fruit of the solar system," because there are more than 1,500 asteroids that are as easy to access as the Moon and that have relatively small gravity fields that make the asteroids easier to approach and depart from, as compared to larger planetary bodies, such as the Moon or Mars.

Planetary Resources Inc. also believes that asteroid mining is the key to overcoming the enormous cost hurdle associated with getting to outer space. The hope is that extraterrestrial mining will lead to the establishment of in-space "gas stations" capable of refueling various types of spacecraft, from Earth-orbiting satellites to vessels bound for Mars and beyond.<sup>19</sup> Because many asteroids are rich in water, the company plans to extract this water for use in space, thereby providing for more efficient launches because supplies, such as water, do not have to be onboard a spacecraft during launch.<sup>20</sup> The uses for asteroid water include helping astronauts stay hydrated, helping grow food during long missions, providing radiation shielding for spacecrafts, and breaking water down into

hydrogen and oxygen, the chief components of rocket fuel. Planetary Resources Inc. claims it takes 50 kilograms of fuel to get one kilogram of cargo into low earth orbit, so providing water and fuel in space means that launch vehicles won't need to bring water with them from Earth, significantly lowering the cost of launches.

Taking advantage of natural resources in outer space is not the only commercial activity being contemplated in space. Robert Bigelow, an American real estate and hotel entrepreneur, is interested in providing accommodation for people traveling to space.<sup>21</sup> Bigelow Aerospace already has two prototype habitat modules in orbit and a contract to provide NASA with the Bigelow Expandable Activity Module, or BEAM, as an addition to the international space station. BEAM will be flown in to space by Elon Musk's SpaceX in mid-2015. Bigelow, who has invested more than 250 million dollars into this venture, doesn't believe that commercial success in outer space is possible without well-defined property rights. The territorial rights he wants would be limited in scope, contingent on ongoing operations, and not absolute. He says that companies "must know they will be able to (1) enjoy the fruits of their labor relative to activities conducted on the Moon or other celestial bodies, and (2) own the property that they have surveyed, developed, and are realistically able to utilize."<sup>22</sup> Bigelow would like to build habitats on the Moon and Mars and argues that such plans will be possible only if the issues of extraterrestrial ownership are clarified.

Going forward, it is unclear how the legal aspects of outer space property rights will work themselves out. As new, affordable spaceflight technologies become available, extensive private space activity is a serious possibility in the very near future. Some argue that the only way to see humanity prosper in space is to recognize that the Outer Space Treaty is outdated and needs to be amended and renegotiated, or rewritten from scratch. Others argue that nations and companies will proceed on their own with the hope that few

conflicts arise. The massive size of the Solar System means that many resources are available, so conflicts may be minimal until the issues become clear enough that appropriate laws can be enacted. Regardless of whether humanity reaches to the stars in the name of science, for mineral riches, or simply to gawk at the cosmos, a clear legal answer to the issue of extraterrestrial property rights will be needed in order for such activities to flourish. ♦

## Endnotes

1. See *The Nation: Red Moon Over the U.S.*, TIME, Oct. 14, 1957, <http://www.time.com/time/magazine/article/0,9171,862748-1,00.html>.

2. See David Johnson, comment, *Limits on the Giant Leap for Mankind: Legal Ambiguities of Extraterrestrial Resource Extraction*, 26 AM. U. INT. L. REV. 1479, note 3 (2012). (Comparing the \$25.4 billion estimated cost of the Apollo Program with the 1969 \$253 million profit for U.S. Steel, demonstrating that private enterprises lacked the necessary resources to spend on the US space program).

3. SpaceX, <http://www.spacex.com/about> (last visited Mar. 31, 2014) (explaining that under a \$1.6 billion contract with NASA, SpaceX will fly at least 12 resupply missions to the international space station and in the near future will deliver crew as well).

4. Full text of the Outer Space Treaty is available at <http://www.unoosa.org/oosa/SpaceLaw/outerspt.html>.

5. U.S. Department of State, <http://www.state.gov/t/isn/5181.htm>.

6. *Id.*

7. Outer Space Treaty Article I.

8. Outer Space Treaty Article IV.

9. Full text of the Moon Treaty is available at <http://www.oosa.unvienna.org/oosa/SpaceLaw/moon.html>.

10. See Rand Simberg, *Property Rights in Space*, 37 THE NEW ATLANTIS, pp. 20–31, <http://www.thenewatlantis.com/publications/property-rights-in-space>.

11. LunarLand.com, <http://www.lunarland.com> (last visited Mar. 31, 2014).

12. 3 *Yemenis Sue NASA for Trespassing on Mars*, CNN INTERACTIVE (July 24, 1997), <http://www.cgi.cnn.com/TECH/9707/24/yemen.mars/>.

13. See *Nemitz v. United States*, No.

CV–N030599–HDM (RAM), 2004 WL 3167042 (9th Cir. 2004).

14. See Douglas Cobb, *NASA Exploring Mining Metal Asteroid Psyche*, LIBERTY VOICE (Jan. 16, 2014) <http://guardianlv.com/2014/01/nasa-exploring-mining-metal-asteroid-psyche/>.

15. See Marc Humphries, *Rare Earth Elements: The Global Supply Chain*, CONGR. RES. SERV. (Dec. 16, 2013) <http://www.fas.org/sgp/crs/natsec/R41347.pdf>.

16. See generally Geology.com, *REE – Rare Earth Elements and Their Uses* (last visited Mar. 31, 2014) <http://geology.com/articles/rare-earth-elements/>.

17. See *Mining the Moon*, POP. MECH. (Dec. 7, 2004), <http://www.popularmechanics.com/science/space/moon-mars/1283056>.

18. Planetary Resources Inc., <http://www.planetaryresources.com/asteroids/> (last visited Mar. 31, 2014).

19. See Mike Wall, *Asteroid Mining Venture Backed by Google Execs, James Cameron Unveiled*, SPACE.COM (Apr. 23, 2014) <http://www.space.com/15395-asteroid-mining-planetary-resources.html>.

20. Planetary Resources Inc., *Asteroid Usage*, (last visited Mar. 31, 2014) <http://www.planetaryresources.com/asteroids/usage/>.

21. Bigelow Aerospace, <http://www.bigelowaerospace.com/> (last visited Mar. 31, 2014).

22. Jeff Foust, *Bigelow Report Calls for Use of COTS Model for Cislunar Transportation*, NEW SPACE J., (Nov. 12, 2013), <http://www.newspacejournal.com/2013/11/12/bigelow-report-calls-for-use-of-cots-model-for-cislunar-transportation/>.